

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-60 (cancelled)

61. (new) A method for transfecting a cell with a nucleic acid molecule comprising contacting said cell with a sphingoid-polyalkylamine conjugate together with said nucleic acid molecule, wherein said sphingoid-polyalkylamine conjugate comprises a sphingoid backbone carrying, via a carbamoyl bond, at least one polyalkylamine.

62. (new) The method of Claim 61, wherein said nucleic acid is associated with said sphingoid-polyalkylamine conjugate.

63. (new) The method of Claim 61, wherein said nucleic acid molecule is a plasmid DNA.

64. (new) The method of Claim 61, wherein said nucleic acid molecule is a small interference RNA (siRNA).

65. (new) The method of Claim 61, wherein said nucleic acid molecule is an oligodeoxynucleotide (ODN).

66. (new) The method of Claim 62, wherein said sphingoid-polyalkylamine conjugate forms lipid assemblies.

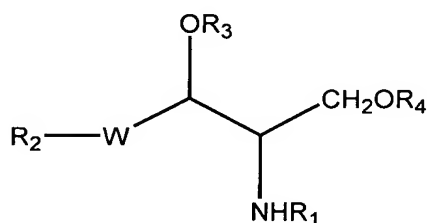
67. (new) The method of Claim 66, wherein said sphingoid-polyalkylamine conjugate forms vesicles, micelles or a mixture of same.

68. (new) The method Claim 61, wherein the sphingoid backbone is selected from ceramide, dihydroceramide, phytoceramide, dihydrophytoceramide, ceramine, dihydroceramine, phytoceramine, dihydrophytoceramine.

69. (new) The method of Claim 61, wherein said sphingoid backbone is a ceramide.

70. (new) The method of Claim 61, wherein said one or more polyalkylamine chains are independently selected from spermine, spermidine, a polyalkylamine analog or a combination thereof.

71. (new) The method of Claim 61, wherein said sphingoid-polyalkylamine conjugate has the following formula (I):



wherein

R_1 represents a hydrogen, a branched or linear alkyl, aryl, alkylamine, or a group $-\text{C}(\text{O})\text{R}_5$;

R_2 and R_5 represent, independently, a branched or linear $\text{C}_{10}\text{--C}_{24}$ alkyl, alkenyl or polyenyl groups;

R₃ and **R₄** are independently a group -C(O)-NR₆R₇, **R₆** and **R₇** being the same or different for **R₃** and **R₄** and represent, independently, a hydrogen, or a saturated or unsaturated branched or linear polyalkylamine, wherein one or more amine units in said polyalkylamine may be a quaternary ammonium; or **R₃** is a hydrogen; or

R₃ and **R₄** form together with the oxygen atoms to which they are bound a heterocyclic ring comprising -C(O)-NR₉-[R₈-NR₉]_m-C(O)-, **R₈** represents a saturated or unsaturated C₁-C₄ alkyl and **R₉** represents a hydrogen or a polyalkylamine of the formula -[R₈-NR₉]_n-, wherein said **R₉** or each alkylamine unit R₈NR₉ may be the same or different in said polyalkylamine; and

n and **m**, represent independently an integer from 1 to 10;

W represents a group selected from -CH=CH-, -CH₂-CH(OH)- or -CH₂-CH₂-.

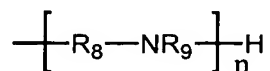
72. (new) The method of Claim 71, wherein **R₁** represents a -C(O)R₅ group, **R₅** being as defined.

73. (new) The method of Claim 71, wherein said **R₂** and **R₅** represent, independently, a linear or branched C₁₂-C₁₈ alkyl or alkenyl chain.

74. (new) The method of Claim 71, wherein **W** represents -CH=CH-.

75. (new) The method of Claim 71, wherein **R₁** represents a -C(O)R₅ group; **R₅** represents a C₁₂-C₁₈ linear or branched alkyl or alkenyl; **W** represents -CH=CH-; **R₂** represents a C₁₂-C₁₈ linear or branched alkyl or alkenyl; **R₃** and **R₄** represent, independently, a group C(O)-NR₆R₇, and **R₃** may also represent a hydrogen, wherein

R₆ and **R₇** represent, independently, a hydrogen or a polyalkylamine having the general formula (II):



wherein

R₈ represent a C₁-C₄ alkyl;

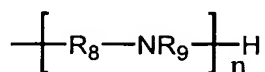
R₉ represents a hydrogen or a polyalkylamine branch of formula (II), said **R₈** and **R₉** may be the same or different for each alkylamine unit, -**R₈****NR₉**-, in the polyalkylamine of formula (II); and

n represents an integer from 3 to 6.

76. (new) The method of Claim 71, wherein **R₃** is a hydrogen atom.

77. (new) The method of Claim 71, wherein both **R₃** and **R₄** represent the same or different polyalkylamine.

78. (new) The method of Claim 71, wherein **R₁** represents a -C(O)**R₅** group; **R₅** represents a C₁₂-C₁₈ linear or branched alkyl or alkenyl; **W** represents -CH=CH-; **R₂** represents a C₁₂-C₁₈ linear or branched alkyl or alkenyl; **R₃** and **R₄** represent independently a group C(O)-**NR₆****R₇**, wherein **R₆** and **R₇** represent, independently, an alkylamine or a polyalkylamine having the general formula (II):



wherein

R₈ represent a C₁-C₄ alkyl;

R₉ represents a hydrogen or a polyalkylamine branch of formula (II), said **R₈** and **R₉** may be the same or different for each alkylamine unit, -**R₈****NR₉**-, in the polyalkylamine of formula (II); and

n represents an integer from 3 to 6.

79. (new) The method of Claim 71, wherein **R₁** represents a -C(O)**R₅** group; **R₅** represents a C₁₂-C₁₈ linear or branched alkyl or alkenyl; **W** represents -CH=CH-; **R₂** represents a C₁₂-C₁₈ linear or branched alkyl or alkenyl; **R₃** and **R₄** form together with the oxygen atoms to which they are bonded a heterocyclic ring comprising -C(O)-[NH-**R₈**]_n-NH-C(O)-,

wherein

R₈ represents a C₁-C₄ alkyl, wherein for each alkylamine unit -NH-**R₈**-, said **R₈** may be the same or different; and

n represents an integer from 3 to 6.

80. (new) The method of Claim 71, wherein said **R₈** is a C₃-C₄ alkyl.

81. (new) The method of Claim 71, wherein said sphingoid-polyalkylamine conjugate is N-palmitoyl D-erythro sphingosyl-1-carbamoyl spermine (CCS).

82. (new) The method of Claim 61, wherein said sphingoid-polyalkylamine conjugate associated with the nucleic acid molecule is also associated with a targeting substance.

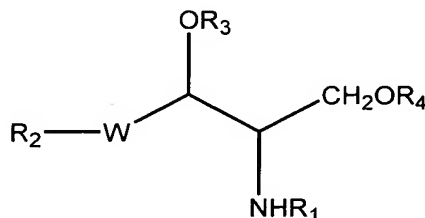
83. (new) A method for transfecting a cell with a nucleic acid molecule comprising contacting said cell with lipid assemblies comprising N-palmitoyl D-erythro sphingosyl carbamoyl-spermine (CCS) and said nucleic acid molecule.

84. (new) A method for the treatment of a disease or disorder, the method comprises providing a subject in need of said treatment an amount of a sphingoid-polyalkylamine conjugate associated with a nucleic acid molecule, wherein said sphingoid-polyalkylamine conjugate comprises a sphingoid backbone

carrying, via a carbamoyl bond, at least one polyalkylamine and the amount of said nucleic acid molecule is effective to achieve a desired biochemical effect once in said target cell.

85. (new) The method of Claim 84, wherein said sphingoid backbone is ceramide.

86. (new) The method of Claim 84, wherein said sphingoid-polyalkylamine conjugate has the following formula (I):



wherein

R₁ represents a hydrogen, a branched or linear alkyl, aryl, alkylamine, or a group -C(O)**R₅**;

R₂ and **R₅** represent, independently, a branched or linear C₁₀-C₂₄ alkyl, alkenyl or polyenyl groups;

R₃ and **R₄** are independently a group -C(O)-**NR₆** **R₇**, **R₆** and **R₇** being the same or different for **R₃** and **R₄** and represent, independently, a hydrogen, or a saturated or unsaturated branched or linear polyalkylamine, wherein one or more amine units in said polyalkylamine may be a quaternary ammonium; or **R₃** is a hydrogen; or

R₃ and **R₄** form together with the oxygen atoms to which they are bound a heterocyclic ring comprising -C(O)-**NR₉**-[**R₈**-**NR₉**]_m-C(O)-, **R₈** represents a saturated or unsaturated C₁-C₄ alkyl and **R₉** represents a hydrogen or a polyalkylamine of the formula

$-[R_8-NR_9]_n-$, wherein said R_9 or each alkylamine unit R_8NR_9 may be the same or different in said polyalkylamine; and

n and m , represent independently an integer from 1 to 10;

W represents a group selected from $-CH=CH-$, $-CH_2-CH(OH)-$ or $-CH_2-CH_2-$.

87. (new) The method of Claim 84, wherein said sphingoid-polyalkylamine conjugate is N-palmitoyl D-erythro sphingosyl carbamoyl-spermine (CCS).

88. (new) A transfection composition comprising:
a sphingoid-polyalkylamine conjugate comprising a sphingoid backbone carrying, via a carbamoyl bond, at least one polyalkylamine; and
a nucleic acid molecule.

89. (new) The transfection composition of Claim 88, comprising a physiologically acceptable carrier.

90. (new) The transfection composition of Claim 88, wherein said nucleic acid molecule has, at a physiological pH, a net negative dipole moment, at least one area carrying a negative charge or a net negative charge.

91. (new) The transfection composition of Claim 88, wherein said nucleic acid molecule is a plasmid DNA.

92. (new) The transfection composition of Claim 88, wherein said nucleic acid molecule is a small interference RNA (siRNA).

93. (new) The transfection composition of Claim 88, wherein said nucleic acid molecule is an oligodeoxynucleotide (ODN).

94. (new) The transfection composition of Claim 88, wherein the sphingoid-polyalkylamine conjugate forms lipid assemblies.

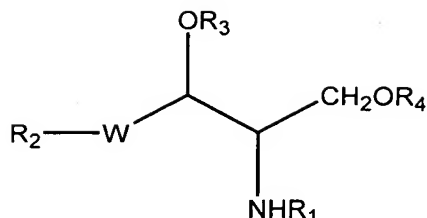
95. (new) The composition of Claim 94, wherein the sphingoid-polyalkylamine conjugate forms vesicles and/or micelles.

96. (new) The transfection composition of Claim 88, wherein the sphingoid backbone is selected from ceramide, dihydroceramide, phytoceramide, dihydrophytoceramide, ceramine, dihydroceramine, phytoceramine, dihydrophytoceramine.

97. (new) The transfection composition of Claim 94, wherein said sphingoid is a ceramide.

98. (new) The transfection composition of Claim 88, wherein said one or more polyalkylamine chains are independently selected from spermine, spermidine, a polyalkylamine analog or a combination thereof.

99. (new) The transfection composition of Claim 88, wherein said sphingoid-polyalkylamine conjugate has the following formula (I):



wherein

R₁ represents a hydrogen, a branched or linear alkyl, aryl, alkylamine, or a group -C(O)R₅;

R₂ and **R₅** represent, independently, a branched or linear C₁₀-C₂₄ alkyl, alkenyl or polyenyl groups;

R₃ and **R₄** are independently a group -C(O)-NR₆R₇, **R₆** and **R₇** being the same or different for R₃ and R₄ and represent, independently, a hydrogen, or a saturated or unsaturated branched or linear polyalkylamine, wherein one or more amine units in said polyalkylamine may be a quaternary ammonium; or **R₃** is a hydrogen; or

R₃ and **R₄** form together with the oxygen atoms to which they are bound a heterocyclic ring comprising -C(O)-NR₉-[R₈-NR₉]_m-C(O)-, **R₈** represents a saturated or unsaturated C₁-C₄ alkyl and **R₉** represents a hydrogen or a polyalkylamine of the formula -[R₈-NR₉]_n-, wherein said R₉ or each alkylamine unit R₈NR₉ may be the same or different in said polyalkylamine; and

n and **m**, represent independently an integer from 1 to 10;

W represents a group selected from -CH=CH-, -CH₂-CH(OH)- or -CH₂-CH₂-.

100. (new) The transfection composition of Claim 88, wherein said sphingoid- polyalkylamine conjugate is N-palmitoyl D-erythro sphingosyl carbamoyl-spermine (CCS).

101. (new) The transfection composition of Claim 88, comprising a targeting substance.

102. (new) A kit comprising a sphingoid-polyalkylamine conjugate comprising a sphingoid backbone carrying, via a carbamoyl bond, at least one polyalkylamine; and instructions for use of said sphingoid-polyalkylamine conjugate as a capturing agent of a nucleic acid molecule.

103. (new) The kit of Claim 102, for use in transfection of a cell with the nucleic acid molecule.

104. (new) The kit of Claim 102, comprising a lipid assembly comprising N-palmitoyl D-erythro sphingosyl carbamoyl-spermine (CCS).

105. (new) A complex comprising a sphingoid backbone carrying, via a carbamoyl bond, at least one polyalkylamine; and a nucleic acid molecule associated with said sphingoid-polyalkylamine conjugate.

106. (new) The complex of Claim 102, wherein said sphingoid-polyalkylamine conjugate is N-palmitoyl D-erythro sphingosyl carbamoyl-spermine (CCS).